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IS 11675 (1986): Button cells - Silver oxide [ETD 10:
Primary Cells and Batteries]

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Indian Standard
SPECIFICATION FOR
BUTTON CELLS — SILVER OXIDE

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR BUTTON CELLS — SILVER OXIDE

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Indian Standard
SPECIFICATION FOR
BUTTON CELLS — SILVER OXIDE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 22 April 1986, after the draft finalized by the Primary Cells and Batteries Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 With the increasing use of electronic watches, hearing aids and pocket calculators in the country, the manufacture of button cells — silver oxide, for such equipment has also started. This specification covers the tests and requirements of such cells. At present, only four types of cells which are currently being manufactured in India are covered in this standard.

0.2.1 Formulation of Indian Standards on the following button cells is under consideration:

- a) Button cells — Alkaline Manganese,
- b) Button cells — Manganese oxide,
- c) Button cells — Mercuric oxide,
- d) Button cells — Mercuric oxide and Manganese oxide, and
- e) Button cells — Lithium.

0.3 In the preparation of this standard, assistance has been derived from the following publications:

IEC Pub 86-2 (1982) Primary batteries : Part 2 Specification sheets.
 International Electrotechnical Commission (IEC).

JIS C8510-1969 Silver oxide cells and batteries. Japanese Standards Association.

JIS C8511-1985 Alkaline primary cells and batteries. Japanese Standards Association.

0.4 This standard shall be read in conjunction with IS : 6303-1984*.

*General requirements and methods of tests for dry cells and batteries (*first revision*).

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down the dimensions, tests and requirements of silver oxide dry cells with silver oxide as main depolarizer, of designations SR41, SR43, SR44 and SR54 (SR1130) for use in watches, hearing aids, pocket calculators, etc.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 1885 (Part 15)-1977† and IS : 6303-1984‡ shall apply.

3. DESIGNATION

3.1 The cells covered by this standard shall be designated by three letters as under:

First letter (S) indicates silver oxide depolarizer, a solution of potassium hydroxide as an electrolyte and zinc powder electrode.

Second letter (R) indicates round cells.

Third letter (Number) which follows the letters is an empirical number and indicates the size variation for a given shape.

NOTE — Cross reference of designations of batteries in the international market is given in Appendix B for information purposes only.

4. NOMINAL VOLTAGE

4.1 The nominal voltage of the silver oxide cells shall be 1.55 volts.

5. DIMENSIONS

5.1 In some cases, a battery is adequately defined by two or three linear dimensions. For some batteries, it is sometimes necessary to describe the battery in greater detail. This is done by specifying additional battery dimensions. Asymmetry of battery shape and/or terminals enables the compartment to be designed so that the batteries can be inserted only with the correct orientation.

*Rules for rounding off numerical values (*revised*).

†Electrotechnical vocabulary: Part 15 Primary cells and batteries.

‡General requirements and methods of tests for dry cells and batteries (*first revision*).

5.2 The standard overall dimensions of cells shall be in accordance with Fig. 1 and Table 1. The symbols used to denote the various dimensions are:

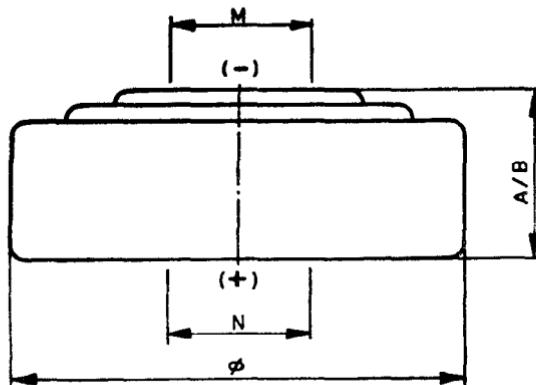
A = maximum overall height of the battery,

B = minimum distance between the flats of the positive and negative contacts,

M = minimum diameter of the flat negative contact,

N = minimum diameter of the flat positive contact, and

ϕ = maximum and minimum diameters of the battery.



NOTE — Any difference between the height of the battery and the distance between contacts shall not exceed 0.1 mm.

FIG. 1

TABLE 1 STANDARD OVERALL DIMENSIONS
(Clause 5.2)

All dimensions in millimetres.

SL No.	DESIGNATION	DIMENSIONS							
		A/B		M		N		ϕ	
		Max	Min	Max	Min	Max	Min	Max	Min
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	SR41	3.6	3.3	—	3.8	—	3.8	7.90	7.55
ii)	SR43	4.2	3.8	—	3.8	—	3.8	11.60	11.25
iii)	SR44	5.4	5.0	—	3.8	—	3.8	11.60	11.25
iv)	SR54	3.05	2.75	—	3.8	—	3.8	11.60	11.25

5.3 Any difference between the overall height of the battery and the distance between the contact areas shall not exceed 0.1 mm.

5.4 Method of Checking Dimensions Through Gauges — Under consideration.

6. CONSTRUCTION

6.1 The cells shall be free from:

- a) terminals that do not make and maintain positive contacts to the external circuits,
- b) corroded terminals,
- c) packing which is loose and liable to be pilfered, and
- d) leaky or distorted containers.

6.2 The terminals shall provide and maintain good electrical contact with the external circuit and shall be so secured in the cell that they are not displaced by insertions and withdrawals in normal use.

6.3 Contact Pressure Resistance

6.3.1 A force of 10 N applied through a steel ball of 1 mm diameter at the centre of each contact area for a period of 10s shall not cause any apparent deformation which might prevent satisfactory operation of the battery.

7. PERFORMANCE REQUIREMENTS

7.1 The performance requirements of SR41, SR43, SR44 and SR54 cells shall be as given in Table 2.

8. MARKING

8.1 The following information shall be marked on the batteries:

- a) Brand name/name of the manufacturer;
- b) Type number;
- c) Polarity;
- d) Country of origin;
- e) Date of manufacture;
- f) 'Do not recharge the cells';
- g) 'Connect correctly with +ve and -ve terminals; and
- h) 'Keep the cells out of reach of children. If swallowed, contact the doctor immediately'.

TABLE 2 PERFORMANCE REQUIREMENTS FOR SILVER OXIDE CELLS
(Clauses 7.1, 9.2.1, 9.4.1 and 9.5)

SL No.	CELL DESIGNATION	DISCHARGE CONDITIONS			RATED LIFE, Min			
		Resistance ohms	Period of Con- tinuous Discharge	End Point Voltage	Initial	Storage Period	Delayed	Delayed Under Dry Heat Conditions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	i)	SR41	15 000	24	1.2	350	12	315
	ii)	SR43	1 000	do	do	56	do	50
	iii)	SR44	510	do	do	40	do	36
	iv)	SR54	1 000	do	do	36	do	32

8.2 In addition, the following information shall be marked on the carton:

- a) 'Do not put used cells into fire as they are likely to explode and cause injury';
- b) 'Cells have concentrated alkaline hydro-oxide inside and, therefore, shall not be opened as they are likely to cause burns to skin and clothes, and
- c) 'The leaked cells shall not be touched directly by hand as they may cause injury.'

8.3 The cell may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. TESTS

9.1 General — Unless otherwise specified, provisions of **7.1** to **7.3** of IS : 6303-1984* shall apply.

9.2 Type Tests

9.2.1 The cells shall be subjected to the tests mentioned in **9.2.2** with the discharge conditions given in Table 2.

9.2.2 The following shall constitute type tests:

- a) Checking of dimensions and terminals,
- b) Checking of marking,
- c) Construction,
- d) Initial life test,
- e) Delayed life test, and
- f) Delayed life test under dry heat conditions.

*General requirements and methods of tests for dry cells and batteries (*first revision*).

9.2.2.1 Samples for type tests — The number of samples for each designation required for type tests shall be as under:

Checking of dimensions and terminals	{	All samples
Checking of marking		
Construction		1
Initial life test		3
Delayed life test		3
Delayed life test under dry heat conditions		3
Total		10

9.3 Acceptance Tests — The following shall constitute the acceptance tests:

- Checking of dimensions and terminals,
- Checking of marking, and
- Initial life test.

The samples for acceptance tests and criteria for acceptance shall be in accordance with Appendix A.

9.4 Initial Life Test

9.4.1 The test shall be carried out in accordance with 7.5 of IS : 6303-1984* with the details given in Table 2.

The following readings shall be taken:

- Initial open circuit voltage, and
- Initial closed circuit voltage.

The discharge shall be continued until the closed circuit voltage falls below the specified discharge end point voltage. The time during which the closed circuit voltage is maintained equal to or above the discharge end point voltage shall be taken as the service life.

The cells shall not show any electrolyte leakage harmful for practical use during or at the end of the test.

9.5 Delayed Life Test — The test shall be carried out in accordance with 7.7 of IS : 6303-1984*.

The cells shall be stored for a period as specified in Table 2.

After storage, the cells shall be tested in accordance with 9.4. The batteries shall meet the requirements specified in Table 2.

The cells shall not show any electrolyte leakage harmful for practical use during or at the end of the test.

9.6 Delayed Life Test Under Dry Heat Conditions — The cells shall be stored in an unpacked condition in an atmosphere having $60 \pm 2^{\circ}\text{C}$ temperature and 40 ± 10 percent relative humidity for a period of 20 days.

*General requirements and methods of tests for dry cells and batteries (first revision).

APPENDIX A

(Clause 9.3)

SAMPLING FOR ACCEPTANCE TESTS

A-1. LOT

A-1.1 All cells and batteries of the same type, category and rating manufactured by the same factory during the same period using the same materials and the process.

A-1.2 The number of batteries to be selected from each lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 3.

TABLE 3 SAMPLE SIZE AND ACCEPTANCE NUMBER

(Clauses A-1.2 and A-2.1)

LOT SIZE (1)	SAMPLE SIZE (2)	ACCEPTANCE NUMBER (3)
Up to 100	8	0
101 " 300	13	1
301 " 1 000	20	2
1 001 " 3 000	32	3
3 001 " 10 000	50	5
10 001 " 35 000	80	7
35 001 " 150 000	125	10
150 001 " 500 000	200	14
500 001 and above	315	21

A-1.2.1 These batteries shall be selected from the lot at random. In order to ensure the randomness of selection, procedures given in IS : 4905-1968* may be followed.

A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 All the batteries selected in accordance with col 1 and 2 of Table 3 shall be subjected to the acceptance tests. A battery failing to satisfy any of the requirements of acceptance tests shall be termed as defective. A lot shall be considered as conforming to the requirements of acceptance tests if the number of defectives found in the sample is less than or equal to the corresponding acceptance number given in col 3 of Table 3; otherwise not.

*Methods for random sampling.

A P P E N D I X B
(Clause 3.1)

CROSS REFERENCE OF DESIGNATIONS OF BATTERIES IN THE INTERNATIONAL MARKET

IEC TSI	BATT- ERY	SER- VICE	CAPA- CITY	DIA- METER	HEI- GHT	JIS	JAPAN						INTERNATIONAL						CITI- ZEN	NATIO- NAL	ANSI		
	WEI- GHT	CAPA- CITY	RATED AT				Matsu- Shita	Max- ell	Seiko	Ori- ent	Toshi- ba	Dura- cell	Mal- lory	Var- ata	Ren- ata	UCC	Rov	Ber- ec	Ome- ga				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	
			(g)	(mAh)	(mA)	(mm)	(mm)																
SR41	—	45	—	7.9	3.6	SR 418	—	SR41 SW	SBAI	18, 6	SR41 SW	—	10L 15	527	10	384 37	RW 41L	B-SR 4929	280- 13	WL10	WS4		
SR54	1.3	75	0.25	11.6	3.05	—	SR 1130	SR 1130 W	SBBU	15	SR 1130W (SR 54)	D389 122	10L 544	17	389	RW 49	B-SR 54 H	—	—	WL10	—		
—	1.3	75	0.25	11.6	3.05	—	SR 1130	SR 1130	—	—	SR1130	—	—	—	—	389, 289	RW 49	—	—	280- 16	—	S10	
SR43	1.9	140	1.5	11.6	4.2	SR 43	SR 43	SR 43	—	—	SR43	MS41	MS41 HS	V41	—	541	RS41	—	—	—	—	—	
SR44	2.5	160	3	11.6	5.4	SR 44	SR 44	SR 44	—	—	SR44	MS76	MS76 V76HS	541	—	576	RS76	10L 104	—	—	—	—	